VISUAL PROCESSING AND THERAPY
The Integration of Visual Efficiency and Processing and its Impact on individuals with Sensory Processing Disorders, ADHD, Autism, Dyslexia, and Acquired Brain Injury

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Course Objectives

• Differentiate between eyesight and vision
• Understand the role of vision in early intervention
• Identify visual problems impacting learning
• Screen for vision disorders
• Communicate regarding these areas to other professionals
• Collaborate on therapeutic interventions for vision problems
Ophthalmic Examination Report

Date: 7/20/09
Name: Jonathan
DOB: 3/3/06

Referring Physician:

VISUAL ACUITY

Without glasses:
Right: 20/20
Left: 20/20

With eyeglasses:
Right: 
Left: 

Diagnosis: Hypotonia
Normal Eye Exam

Treatment: None

Remarks:

Return: 2 years or prn

Sincerely,

MD
The Elaborated Scheiman Model

- Visual Efficiency vs. Visual Processing
- Visual efficiency as “hardware” of the visual system
- Visual processing as “software” of the visual system
- The behavioral/developmental optometric approach
- The neurocognitive optometric approach
Key Optometric Websites

- **www.covd.org**
  - College of Optometrists in Vision Development
    - Directory of Board-certified doctors
    - Directory of Board-certified therapists
    - Research references and white papers

- **www.oepf.org**
  - Optometric Extension Program Foundation
    - Products and literature

- **www.aoa.org**
  - American Optometric Association
    - Clinical Practice Guidelines
Key Optometric Books

- Understanding and Managing Vision Deficits – Scheiman

- Eye Power – Appelbaum & Hoopes


Visual Efficiency

• The neurodevelopment of eye tracking, accommodation, and binocular vision
  – Eye tracking: fixations, saccades, pursuits
  – Accommodation: near function relative to distance; amplitude; flexibility
  – Binocular vision: distance vs. near; range, stamina

• The role of screening for these functions vs. comprehensive optometric evaluation
What is “Normal” Vision?
Accommodation: Focusing for Near
Accommodative Flexibility: Switching Focus from Near to Far
Exophoria at Near: Convergence Insufficiency
When the eyes team and aim together normally, print on the page is single and clear.

The dog chased the cat.

Reading requires the eyes to aim in together at the same point on the page. Vision is clear, single, and comfortable as long as both eyes are aiming at the same point.

When eye teaming breaks down, the eyes aim independently, and print doubles.

The dog chased the cat.

Children with eye teaming problems find it difficult to maintain the inward eye aim required for reading. As the eyes tire, they move in or out and end up pointing at different places on the page. The result is blurred or double print.
Reading to Learn

• Efficiency
  – analogy of trying to read in a car

• Related factors
  – Motivation
  – Attention
  – Concentration
Visual Processing

• How the eyes interface with the rest of the brain and body
• Vision problems as neurodevelopmental disorders
• Vision problems as sensory processing disorders
• Visual perceptual testing: standardized and observational
Where Does Vision Occur?
Before the asymmetric tonic neck reflex (ATNR) is integrated, the child will have problems crossing the midline of the body with the hands or the eyes. This may cause reading problems in following the written line from left to right. There may also be problems with binocular vision, and insufficient connections between the two hemispheres of the brain.
Standardized Perceptual Testing: TVPS-3

An example of an item from the Visual Discrimination subtest of the Test of Visual Perceptual Skills - Revised (Gardner, 1996)
An example of an item from the Visual Figure-Ground subtest of the Test of Visual Perceptual Skills - Revised (Gardner, 1996)
Percentile Ranks & Perceptual Profiles

- 25th to 75th percentile
- Change in performance over time
- Relative strengths & weakness
  - Example: differences between visual memory and visual sequential memory
  - Subvocalization to aid poor visual memory
Let’s Take A Break

• See you again at 10:30
Clearing the Ayres: How Developmental Optometry relates to Occupational Therapy and other Disciplines

• A. Jean Ayres, Brain Gym and developmental vision
• Collaboration between therapeutic interventions
• Signs and symptoms of undiagnosed or untreated vision disorders
• Convergence insufficiency symptom survey (CISS)
• Optometric application of lenses and prisms
Anna Jean Ayres

“If I have been productive, it is partly because I have had the advantage of contact with those with the courage as well as the ability to think independently and along unorthodox lines.”
• Visual Attention & Binocularity

Centering

• Acuity (20/20)

Identification

• Cerebellar

Anti-Gravity

• Phonology

Speech-Language
Collaborative Models

- Phonological
- Emotional

Language & Fluidity

Timing & Motor Organization
- Magnocellular
- Cerebellar

Visual Cognition
- Visual Skills

Comprehension & Conceptualization
COVD – Quality of Life Survey
www.covd.org

- Blurred vision at near
- Double vision
- Headaches associated with near work
- Words run together when reading
- Burning, stinging, watery eyes
- Falling asleep when reading
- Vision worse at the end of the day
- Skipping or repeating lines when reading
- Dizziness or nausea associated with near work
- Head tilt or closing one eye when reading
• Difficulty copying from the chalkboard
• Avoidance of reading and near work
• Omitting small words when reading
• Writing uphill or downhill
• Mis-aligning digits in columns of numbers
• Reading comprehension declining over time
• Inconsistent/poor sports performance
• Holding reading material too close
• Short attention span
• Difficulty completing assignments in reasonable time
• Saying “I can’t” before trying
• Avoiding sports and games
• Difficulty with hand tools—scissors, calculator, keys, etc.
• Inability to estimate distances accurately
• Tendency to knock things over on desk or table
• Difficulty with time management
• Difficulty with money concepts, making change
• Misplaces or loses papers, objects, belongings
• Car sickness/motion sickness
• Forgetful, poor memory
Do your eyes feel tired when reading or doing close work?
Do your eyes feel uncomfortable when reading or doing close work?
Do you have headaches when reading or doing close work?
Do you feel sleepy when reading or doing close work?
Do you lose concentration when reading or doing close work?
Do you have trouble remembering what you have read?
Do you have double vision when reading or doing close work?
Do you see the words move, jump, swim or appear to float on the page when reading or doing close work?
• Do you feel like you read slowly?
• Do your eyes ever hurt when reading or doing close work?
• Do your eyes ever feel sore when reading or doing close work?
• Do you feel a “pulling” feeling around your eyes when reading or doing close work?
• Do you notice the words blurring or coming in and out of focus when reading or doing close work?
• Do you lose your place while reading or doing close work?
• Do you have to re-read the same line of words when reading?
Lenses and Prisms
Bifocal Lens
Progressive Addition Lens
Prisms Shift Space Toward Apex
Prisms – Vertical & Horizontal
Yoked Prisms
Yoked Prisms in Action
Lunch on Your Own

• Bon Appetite! See you at 1:00
The neuroplasticity and neuroadaptability of the visual system

• What goes wrong visually, why it goes wrong, and what we can do about it
• Is there an age at which it’s too early or late to intervene?
• Visual problems as early red flags for autism spectrum disorder
• Learning based vision problems and academic performance
• Post-trauma vision disorder and other problems of acquired brain injury
“Stereo Sue”

- Sue Barry, Ph.D.
- Steven Markow, O.D.
- Theresa Ruggiero, O.D.
- Oliver Sacks, M.D.
AUTISM SPECTRUM DISORDER

• Issue: Optometry & Vision Development 2009
  – Richman & Press: Optometric Role in Early Intervention

• Eye Contact, Gaze Aversion, Sharing Joint Attention
Source for Nonverbal Vision Tests

  – Lea Hyvarinen: A “developmental/behavioral ophthalmologist” in Finland
  – Sample: Heidi Expressions Test Game
Learning Based Vision Problems
Jason is in 2\textsuperscript{nd} grade, being tutored in reading. His “Goals” sheet reads:

- **WHY DO YOU THINK YOU ARE HERE?**
  - To help me reed
  - To wake wy rite Eay stonogr

- **WHAT ARE YOUR GOALS?**
  - Not to yoos wy fuingr to reed
  - to wake wy rite eay stogr

- **DO YOU HAVE ANY IDEA HOW THIS WILL HELP YOU IN SCHOOL?**
  - Thith will huelp me To see my pagus Klere
The Dyslexia Screener (TDS)
www.bernell.com/product/3313/67

- Dyslexia as Specific Reading Disability
  - Visual form (dyseidesia)
  - Auditory form (dysphonesia)
  - Mixed
Visual Thinking/Visualization

Example:

• Draw two overlapping circles, one big and one small. Place an “x” in the space common to both circles.
Conceptualization and Generalization of Knowledge

• Draw two overlapping triangles, one big and one small. Place an “x” in the space that is only part of the big triangle.
Vision and Acquired Brain Injury
Primary Visual Sequelae of ABI

• Post-Trauma Vision Disorder
• Midline shift
• Convergence Insufficiency
• Processing speed
• Photophobia (light sensitivity)
Forthcoming Textbook (12/2010)

• Vision Rehabilitation: Multidisciplinary Care of the Patient Following Brain Injury – edited by Suter & Harvey
  – Chapter on Spatial Vision
  • Sanet & Press
Stroke in 2001 affecting left occipital cortex leaves author with alexia sine agraphia.

“The letters of the words appeared as though I was trying to make them out through a heat haze; the letters wobbled and changed shape as I attempted to make them out. What looked like an “a” one moment looked like an “e” the next and a “w” after that. It was like astigmatism on a drunken weekend. Through my eyes a checkerboard became op-art.”
Handson Demonstration of Screening Procedures

• PLRG – the penlight red/green standardized convergence insufficiency screening
• Visual tracking and head movement
• Visual tracking and the midline plane
• Near ↔ Far focusing flexibility
• Information for referral and collaboration
Screening for Convergence Insufficiency – AOA Guidelines

- [www.aoa.org/documents/PLRG-CI-Card.pdf](http://www.aoa.org/documents/PLRG-CI-Card.pdf)

- CISS – Screening Questionnaire

- Penlight Red-Green Procedure
  - Failure is seeing two lights beyond 4 inches

- Therapy procedures
  - [http://www.aoa.org/x13917.xml](http://www.aoa.org/x13917.xml)
Let’s Take a Break

• See you at 3:15
Overview of Sample Therapeutic Activities

• Nearpoint of convergence and touch
• Physiological diplopia and divided attention
  – The Brock String
• Hart Chart Saccadics
  – Visual Crowding
• Pointer-in-straw in three dimensions
• Central/peripheral awareness
• Press Lites
Nearpoint of Convergence: Interest and Attention
Touch and Kinesthetic Feedback
Physiological Diplopia and Brock String
Brock String and Visual Space

<table>
<thead>
<tr>
<th>Space</th>
<th>Beads</th>
</tr>
</thead>
<tbody>
<tr>
<td>Extrapersonal</td>
<td>Far Bead</td>
</tr>
<tr>
<td>Peripersonal</td>
<td>Middle Bead</td>
</tr>
<tr>
<td>Personal</td>
<td>Near Bead</td>
</tr>
</tbody>
</table>
Hart Chart Saccades

```
2   4   6   8   10

1   O F N P V D T C H E
    Y B A K O E Z L R X

3   E T H W F M B K A P
    B X F R T O S M V C

5   R A D V S X P E T O
    M P O E A N C B K F

7   C R G D B K E P M A
    F X P S M A R D L G

9   T M U A X S O G P B
    H O S N C T K U Z L
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Customized Hart Charts (Ice Age)
Saccades & Visual Crowding
Near ← → Far Hart Charts
Switching Planes?
Pointer-in-Straw:
Z Axis vs. Y vs. X Axis
Monocular vs. Binocular
Peripheral Awareness
Life Gear Glow Sticks: “Press Lites”
Contact Information for Dr. Press

• pressvision@aol.com
• www.pressvision.com
• www.visionhelp.com
• 17-10 Fair Lawn Avenue, Fair Lawn NJ 07410
• 201-794-7977
• THANK YOU!